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Seeking Net Zero: The Challenge and Opportunity of Climate Change

I last spoke to this group in August 2011, just as the NZPC was getting underway.

For tonight, I was asked to concentrate on our latest (and 12th) inquiry, due for release next week. This deals with issues that have the potential to make all others seem trivial – climate change.

To frame this discussion, let me start with the terms of reference for our inquiry into the transition to a low emissions economy. These were originally issued by the previous National-led government. It had recently signed up to the Paris Agreement and had committed to achieving a 50% reduction in New Zealand's greenhouse gas emissions from 1990 levels by 2050.

Ministers Joyce, Bennett and Bridges asked the Commission to “examine the range of current and potential government interventions that could both support a transition to a lower emissions economy and support growth of incomes and wellbeing”. Note the parallel objectives of growth, wellbeing and sharply lower emissions.

Partway through the inquiry came the election and a change of government. The incoming Minister for Climate Change, James Shaw, asked us to continue our work, but to include consideration of a more ambitious target – namely to reach net zero emissions by 2050.

First, some comments on the magnitude of the task we, and other countries face with respect to eliminating emissions of anthropogenic GHG's. British Economist Dimitri Zenghelis draws attention to the astonishing lift in global living standards since the onset of the industrial revolution (Zenghelis, 2016). The combustion of fossil fuels has been integral to that transformation and, in his words, “capitalism was founded on carbon”.

Despite the rise of renewable energy sources, particularly wind and solar, and the older technologies of hydro and nuclear power, the global economy still draws around 80% of its primary energy from fossil fuels (IEA & IRENA, 2017). Globally, we have to break a 250 year habit.

Another feature of this decarbonising transition that the climate scientists know well, but which often gets lost in the popular chatter is the flow versus stocks distinction. While the national targets generally refer to flows - for instance, NZ's commitment to reach “50% below 1990 levels by 2050” - what really matters is the evolving volume, or stock, of GHG's in the atmosphere.

Until that stock ceases its inexorable rise, climate warming and associated weather disruptions will continue to grow in intensity. Reaching net zero is the inescapable global target. The only variable is the date.

That point is critical because, for CO₂ and other long-lived gases (such as N₂O), every additional tonne emitted is, in all relevant respects, a permanent addition to the stock of atmospheric GHG's. It will be there,

exercising its influence on the climate, throughout our lifetimes, our childrens' lifetimes, our grandchildrens' lifetimes and another few generations beyond as well.

I'll talk about short-lived gases later – particularly methane which is obviously critical in the New Zealand context. We think there is an important distinction to be made between the long and short-lived gases.

The task of the Productivity Commission is not to review or critique the science of climate change nor to assess the particular target to which New Zealand should aspire.

Rather, our focus has been on how we could reach net zero most efficiently.

Undeniably, over the next 30 years, this transition will touch most corners of the economy and our communities. It will involve early redundancy of skills and capital. It will also involve substantial new investment, new industries and new jobs. It will be critically dependent on innovation – both discovery and implementation - on a grand scale.

But in many respects, the challenge ahead is much as it has always been. Economies are always in flux. Unsuccessful firms close, new ones open, jobs change, skills fall in and out of favour, whole communities thrive then stagnate.

Successful economies embrace that change. They seek innovation, absorb it and redeploy resources from old to new and more productive activities to support growth, higher incomes, better social and environmental outcomes. They strive to live better, but within their bounds of social, economic and environmental capacity.

New Zealand's lack-lustre productivity performance of the past few decades lies within that realm – inertia, too little innovation, too much pressure on our natural resource endowment and a preference to protect the status quo ahead of investing in change for a better future.

The climate change challenge is essentially the same old set of policy issues around the performance of our economy wrapped in a different cloak.

Done well, a strategy for decarbonisation could help us break out of the low productivity, low wage, low capital intensity, high resource dependency trap that has characterised our history. Done poorly, we will continue or even accelerate our relative decline.

So what lies ahead? The punch line is that to meet our Paris targets, we stop burning fossil fuels and substitute clean or near clean electricity as the energy source for transport and industry – leaving space for alternatives such as biofuels or hydrogen.

Beyond that, land use also shifts. Fewer livestock (particularly sheep and beef), more horticulture and cropping, and more trees. A lot more trees. The low-cost transition is very dependent on extensive afforestation. Trees are not a permanent solution. But they do buy us an additional 30 or 40 years of adjustment time. Without the afforestation, we have to push a lot harder, and more expensively, elsewhere.

The good news is that technology is coming our way – and quite quickly. In this transition, technology is our friend. In electricity generation, light and heavy road transport, industrial heat and other current emissions sources, there is good reason to be optimistic that zero or low emissions energy sources will be viable within the 30 year window available to us. These are technologies that will be price competitive with fossil fuels and have practical application.

With that backdrop, our inquiry report can be broken into a handful of key themes.

Stable and Credible Climate Policy

This transition will involve redundancy of existing, carbon dependent, capital stock, and breaking existing path dependencies in business, skills, and technology. For that reason, clear, firm and stable signalling of future policy is essential. That means consistent policy direction over decades. Without that, the transition will be more costly.

Our political system demands that oppositions oppose. Policies of the government should be challenged - vigorously. Different parts of the electorate will experience the impact of change differently, and their views will be reflected back into the political system.

The climate change policies of each major party don't need to be the same in all respects. But without a fair degree of consistency through electoral cycles, we can't expect firms facing major investment decisions, the sort that lock in technologies for decades, to be aligned with a least cost transition.

Mark Carney, Governor of the Bank of England describes the climate challenge as a tragedy of the horizon (Carney, 2016) – climate change imposes a cost on future generations which the current generation has no direct incentive to fix. That seems to be simply a longer-term version of the familiar monetary policy time inconsistency issue. Setting a long-term policy goal when faced with time inconsistency, and then progressing steadily towards that goal over decades, is always a challenge for open and democratic political systems.

The cross-Parliament Globe NZ group initiated by Kennedy Graham in the last Parliament has been a valuable contributor to bi-partisan policy understanding and convergence. Hopefully it will continue to be supported.

But institutional design can also assist, and we know a thing or two about how to do this.

Laws and Institutions

It's almost 30 years since the Reserve Bank Act was passed, establishing an independent monetary policy decision-making mechanism. Around the same time came the Public Finance Act and other pieces of our legislative framework, all designed to provide some protection for commonly favoured long-term goals (price stability, fiscal sustainability) in the face of the usual forces seeking shorter term political gratification.

There are lessons in our previous experiences that are relevant to climate change policy.

We have recommended the establishment of a Climate Change Commission (CCC), modelled in large part on the UK Climate Change Committee that has been in place since 2008 (Weeks, 2017). The Zero Carbon Bill currently out for consultation incorporates this recommendation.

The essence of the CCC has echoes of the Reserve Bank Act – a long-term target established in statute, but the CCC assigned the tasks of recommending shorter-term GHG budgets as stepping stones along the way to the end target. It is also tasked with reporting on progress, undertaking analysis and providing information.

Emissions Pricing

Climate change is not just a tragedy of the horizon, as Mark Carney's says, but also a classic tragedy of the commons. Offloading greenhouse gases and other forms of pollution into the atmosphere has been

regarded essentially as a universal right. Most of our major environmental problems - whether in the atmosphere, waterways or on land - start with unpriced externalities of this sort.

It is not surprising, therefore, that a common policy response is to create property rights around emissions, establish a volume constraint and then put a price on access to those rights.

New Zealand was an early adopter with an all gases, all sectors ETS introduced in 2008. It was a decent attempt at getting an influential price on emissions. But it did not survive the change of government in November 2008. Biological emissions were excluded by the new government. Subsequently, access to low quality international emissions units saw prices collapse to near zero. As a consequence, the ETS has had very little impact on our emissions profile to date.

That situation can't continue. A robust price on emissions is an essential motivator for action across the economy. We are recommending a resurrection and strengthening of our ETS regime and its supporting institutional framework.

In the course of this inquiry, the Commission has engaged with a consortium of researchers (Vivid, Motu and Concept Consulting – hereafter CMV) to explore alternative future pathways. That work is available from our website. CMV apply a range of different assumptions, especially about the nature and pace of future innovations, to identify efficient pathways to our targets and to illuminate the nature of associated risks and sensitivities.

The results suggest emissions prices rising from the current \$24/tonne to at least \$75/tonne and possibly over \$200/tonne as we approach 2050. This price increase over time results from both the removal of free allocations of units and moving up the marginal abatement cost curve.

NZIER modelling, as used in the discussion document accompanying the Net Zero Bill currently under consultation, suggests much higher prices. Our sense is that CGE modelling, over these timeframes and where significant innovation and structural change can be expected, is unlikely to be very robust. In short, we think the work from our hosts is throwing up unreasonably high future prices. One reason is its lack of linkages through to the land use sector, which in the CMV modelling provides a critical part of the least-cost response. We are aware that NZIER's further modelling will include these links.

In the course of the inquiry, we have undertaken an enormous amount of consultation and engagement, including with our major emitting industries. I have been impressed by how intensively our business leaders are exploring options to reduce emissions, and what they are coming up with.

It is obvious that there has been a mood change within our business community over the past couple of years, in the direction of firms building GHG mitigation (and other aspects of sustainability) firmly into their strategic and investment planning.

Those conversations have given me some confidence that the price range we have identified is in the right ball park. We will see substantial action from firms well within the emissions price range outlined in the CMV work.

Regulation and policies

Getting an effective price on emissions is central to our prescription. But price, by itself, won't be sufficient. There are areas where regulatory interventions are likely to be necessary to shift entrenched patterns of behaviour, or where path dependency issues are likely to be strong. I won't dwell on those tonight.

But one area where very careful and sophisticated regulatory design will be required is the electricity sector. It is a critical element in the transition.

The generation and distribution system is innately complex – competing generators, feeding into a natural monopoly grid, in turn feeding into local monopolies. Then add increasing points of distributed generation, including some “behind-the-meter”. For good measure, the system needs to collaborate in important areas to maintain the quality and reliability of supply, including through dry years when hydro generation is limited.

The Electricity Authority and Commerce Commission have roles in competition regulation that abut - quite awkwardly in places. Neither has a role to promote low emissions generation. Moreover, the competition regulatory issues get very tricky when it comes to ensuring that generating capacity exists to cover short and longer-term demand peaks.

Our sense is that regulatory interventions to push towards a completely carbon free grid, or to force a particular solution for hydro-firming, for instance, need very careful design to avoid expensive, unintended consequences. Our report deals extensively with these issues. Extensive supporting work from Sapere is on our website.

It will be important to get this right, since the CMV work suggests that our carbon zero future will require around 50% more electricity generating capacity – Transpower’s analysis picks an increase of closer to 100%. Wind, geothermal, and distributed solar all look like viable and efficient options to meet that demand.

But to revert to my earlier point of the climate change challenge being an extension of our wider issue of poor productivity, all of these options to expand electricity generating capacity will test our current planning and resource management regimes. Not all will welcome new windfarms on the hills.

Two gases

For most countries, agricultural emissions don’t feature in their mitigation strategies. That’s hardly surprising – for most, CO₂ is their overwhelmingly dominant challenge. For us, of course, agriculture, at almost half our total emissions, is core to our response.

Continuing reductions in ruminant methane emissions will occur with available or emerging techniques and technology. But not elimination. So long as we are farming livestock there will be emissions of methane.

As noted at the outset, it is the stock of atmospheric GHG’s that matter. For long-lived gases, reaching net zero emissions is the only way to halt the rise in the atmospheric stock.

For short-lived gases, the story is different. To reach the same goal, that is, to halt the rise in the stock, the first aim is to prevent increases in the flow of emissions. With a life of under 20 years, a flat to declining flow of emissions of methane is consistent with a flat to declining stock.

There is a case for going beyond flat to seek a reduction in the flow (and therefore the stock) over time. But to halt an increase in the warming influence from short-lived gases we do not have to target net zero emissions.

This stance is consistent with the science and there seems to be increasing uptake of this concept in the international literature (Allen, Cain, & Shine, 2017; Allen et al., 2018).

In our report, we will re-iterate a recommendation from our draft that NZ pursue a two gases approach, with separate strategies for long-lived and short-lived gases. For short-lived gases (mostly methane), we will also float an alternative to the ETS for managing down the stock.

The two gases approach takes some pressure off the response required from livestock industries, but the sector is certainly not off the hook.

Amongst the long-lived gases is N₂O, at 22% of agricultural emissions. Our advice is that nitrous oxide should be included in the ETS alongside CO₂. That will exert pressure to constrain the use of nitrogen fertilizers and improve management of dung and urine, especially in the dairy sector. That will challenge farmers to search for mitigation techniques. It is also likely to have significant co-benefits in terms of reducing loss of nitrates to ground water.

My final point on the agriculture and land-use sector is that, under the scenarios outlined in our report, that sector will contribute more than half of the nation's reduction in net emissions. That comes from reduced livestock numbers associated with land-use change – especially towards afforestation, but also to horticulture and cropping – from reduced emissions intensity in livestock production, and in the sequestration associated with afforestation.

Concluding Comments

New Zealand's efforts to reach net zero are not going to save the planet. Our emissions amount to a little under 0.2% of the global total. What we do will be lost in the roundings. About 80% of emissions originate in G20 countries, so that's where the big effort is required.

But small emitters, ie, those countries individually contributing less than 1% of the global total, collectively account for around 25% of the total (there is some overlap between the G20 and small emitters groups). So small matters. This is a challenge of the global commons. As such, solutions are only possible when all nations recognise that they are a part of the problem and therefore must be contributors to the solution.

By doing our bit, with intelligence and energy, we build our capacity to influence others to do likewise. To my mind, it is both valid and efficient for New Zealand to aim to influence others to higher ambition in their climate change responses.

In releasing our draft report, we labelled the emissions reduction task as “challenging but achievable”. I continue to hold that view – in large part because I am an optimist on emerging technologies. I am amazed daily by the innovations being reported. Michelin will be marketing car tyres using wood-based product in place of petroleum derived materials within the next couple of years. Bill Gates is sponsoring carbon capture and storage technology that is progressing with rapidly declining costs to the point where it could become viable within years rather than decades. Battery and solar power technology has made massive strides in recent years, with more to come. The list goes on.

On the other side of the ledger, a recent report by Standard & Poor's on the major global oil companies suggested that their collective strategic planning processes have them expecting to sell oil-based fuels at about current levels for another 3 decades or so. That level of oil consumption cannot be reconciled with the Paris Agreement targets. Something has to give.

I may be a technology optimist, but technology, of itself, does nothing if not implemented. We've not been very good at identifying and deploying new ways of doing things. Our firm level research at the Commission has consistently showed a wide and enduring productivity gap between world leading firms and the leading New Zealand firms in the same sector, and another large and persistent gap between New Zealand leading firms and the rest – the also rans.

In our original issues paper for this inquiry we observed that “the shift from the old economy to a new, low-emissions economy will be profound and widespread, transforming land use, the energy system, production methods and technology, regulatory frameworks and institutions, and business and political culture”.

Now, as we complete our work, that still seems like a reasonable assessment. This is achievable. But will be a big stretch – requiring the sort of flexibility and capacity to innovate and adjust that has not been evident in recent history.

Real success here would be turning the climate challenge into a catalyst for future, sustainable prosperity and wellbeing.

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